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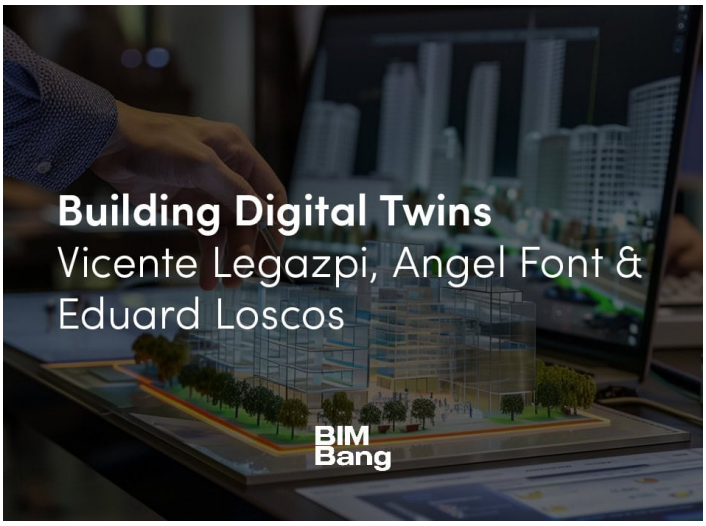

BUILDING DIGITAL TWINS, SIMULATION TECHNICAL INSIGHT

Posted on October 7, 2025 by Dima Fadel

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Tags: bim, Data Mapping, Data storage, digital twins, energy efficiency, environmental simulations, Lifecycle, Zero emissions

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Building Digital Twins, Simulation Technical Insight is a technical report developed within the European Union's Horizon 2020 SPHERE project (grant Nº 820805). Authored by P. Vicente Legazpi, Ángel Font, and Eduard Loscos, the document explores the integration of Building Information Modelling (BIM) and simulation technologies to create dynamic, data-driven digital twins for the built environment. It defines key concepts, methodologies, and simulation frameworks that enable real-time optimization, occupant-centric design, predictive control, and lifecycle management of buildings.

The report outlines the essential relationship between mathematical simulation and BIM, stressing the need for coherent data structures and functional models to ensure interoperability. It describes the role of simulation in enhancing building performance—from model predictive control (MPC) to energy-efficient retrofitting, fault detection, and advanced facility management. Furthermore, it discusses human-building interaction, energy modeling for zero-net-emission buildings, and the future integration of digital twins with smart grids and microgrid systems. The study concludes by emphasizing how simulation will underpin next-generation building operations, privacy management, and sustainable urban transformation.

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